

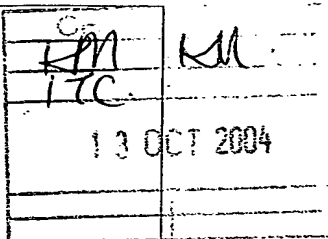
PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

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WRITTEN OPINION
(PCT Rule 66)

Date of mailing
(day/month/year)

11.10.2004

Applicant's or agent's file reference
P/63698/GPTX18

REPLY DUE

within 2 month(s)
from the above date of mailing

International application No.
PCT/GB 03/04195

International filing date (day/month/year)
29.09.2003

Priority date (day/month/year)
02.10.2002

International Patent Classification (IPC) or both national classification and IPC
H04B10/17

Applicant

MARCONI COMMUNICATIONS LIMITED et al

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application
3. The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If **no reply is filed**, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 02.02.2005

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I. Basis of the opinion

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*):

Description, Pages

1-13 as originally filed

Claims, Numbers

1-12 as originally filed

Drawings, Sheets

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	
Inventive step (IS)	Claims	1-12
Industrial applicability (IA)	Claims	

2. Citations and explanations**see separate sheet**

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents - cited in the International Search Report -:

D1: EP-A-1 182 808
D2: WO 02/17520 A
D3: US 2002/097480 A1

2. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claims 1-12** does not involve an inventive step in the sense of Article 33(3) PCT. Detailed explanations in this respect will be given in the next paragraphs.

3. The document D1 is regarded as being the closest prior art to the subject-matter of independent **claim 1**, and discloses (cf. abstract; page 2, line 56-page 3, line 53; page 4, line 30-page 6, line 46; figs.3,8,10,12,14,15):

A Raman amplification system for amplifying WDM radiation (104) propagating along an optical fibre (1), said WDM radiation (104) comprising a plurality of radiation components each having a selected waveband, the system comprising:

- a plurality of optical radiation generating means (6-1,..., 6-n) operable to generate pump radiation of a selected wavelength and power, said radiation being coupled into said fibre (1) to optically amplify the WDM radiation (104); and

- means (PD1,...,PDm) for measuring the power of the radiation components of the WDM radiation (104) after it has propagated along the fibre (1) and has been amplified,

wherein the power of operation of the pump generating means (6-1,..., 6-n) is controlled in dependence upon the measured power such as to make the measured powers substantially equal in magnitude and of a selected magnitude.

4. The subject-matter of **claim 1** therefore differs from the disclosure of D1 in that:

(a) the feedback loop which is used in D1 to control the optical power of the pump

generating means is also used - in **claim 1** - to control the pump wavelength and, thus, the pump generating means of **claim 1** are wavelength tunable.

5. The problem to be solved by the present invention may therefore be regarded as:
- how to provide and optimize Raman amplification in a WDM system.

6. The solution proposed in **claim 1** of the present application cannot be considered as involving an inventive step (**Article 33(3) PCT**) for the following reasons:

(a) A skilled person knows that the gain of a Raman amplifier is dependent not only on the optical power but also on the wavelength of the pump generating means. See, for example, comments and/or explanations in this respect in documents D1 (par.0054), D2 (page 5, lines 16-18) or D3 (par.0009, 0094, 0095; claims 9, 62). Thus, it would be a straightforward design option for a skilled person to add wavelength control to the above mentioned feedback loop of D1 - where power control of the pump is already implemented - in order to drive and/or to optimize Raman amplification in a WDM system.

Consequently, the subject-matter of **claim 1** is regarded as a matter of obviousness for a skilled person in view of D1.

7. Dependent **claims 2-12** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, the reasons being as follows:

(a) **claims 2-6 and 10** consist merely of normal design options and/or procedures that the skilled person would take into consideration - in accordance with circumstances and without the exercise of inventive skill - when involved in the design of a Raman amplifier as the one known from D1;

(b) the feature of combining different states of polarization of pump sources in order to reduce polarization dependent gain is also known from D1 (par.0093; fig.10) or D2 (page 6, lines 1-15, figs.2,3). The subject-matter added by **claims 7-9** is therefore regarded as a matter of obviousness for a skilled person;

(c) the subject-matter of **claims 11 and 12** is also disclosed by D1 (par.0146; claims 56-59 and 64-67).

8. Miscellaneous

(a) Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D3 is not mentioned in the description, nor are these documents identified therein.

(b) In order to facilitate the examination of the conformity of the amended application with the requirements of Article 34(2)(b) PCT, the applicant is requested to clearly identify the amendments carried out, no matter whether they concern amendments by addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based (see also Rule 66.8(a) PCT).

If the applicant regards it as appropriate these indications could be submitted in handwritten form on a copy of the relevant parts of the application as filed.

(c) The applicant is requested to file amendments by way of replacement pages in the manner stipulated by Rule 66.8(a) PCT. In particular, fair copies of the amendments should be filed preferably in triplicate.

Moreover, the applicant's attention is drawn to the fact that, as a consequence of Rule 66.8(a) PCT the examiner is not permitted to carry out any amendments under the PCT procedure, however minor these may be.